Course Number and Title: NMT 202 Nuclear Medicine II

Campus Location:
Wilmington

Effective Date:
2021-51

Prerequisite:
NMT 201

Co-Requisites:
NMT 211, NMT 223, NMT 296

Course Credits and Hours:
3.00 credits
3.00 lecture hours/week
0.00 lab hours/week

Course Description:
This course is the continued study of current uses of radiopharmaceuticals for organ visualization and function, evaluation of results, and pathology.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
Nuclear Medicine Program Policy Manual Allied Health/Science Department Program Student Policy Manual

Schedule Type:
Classroom Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Differentiate and explain the radiopharmaceutical and/or pharmaceutical needed for each in-vivo and in-vitro nuclear medicine procedure. (CCC 5, 6; PGC 1)
2. Identify and recognize indications for each in-vivo and in-vitro nuclear medicine procedure. (CCC 6; PGC 1)
3. Identify anatomy, physiology, and cross-sectional anatomy for each in-vivo and in-vitro procedure. (CCC 1, 2; PGC 1, 2)
4. Evaluate and select data acquisition parameters and processing for each in-vivo and in-vitro procedure. (PGC 1, 2)
5. Describe patient positioning and anatomical landmarks. (CCC 6; PGC 1)
6. Describe patient preparation for each in-vivo and in-vitro procedure. (CCC 1, 2, 3; PGC 1, 4).

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Differentiate and explain the radiopharmaceutical and/or pharmaceutical needed for each in-vivo and in-vitro nuclear medicine procedure.
    1. Explain primary photon energies used for imaging.
    2. Justify the rationale for radiopharmaceutical selection.
    3. Discuss method of localization.
    4. Define *biologic*, *effective*, and *physical half-life*.
    5. Explain the mode of uptake for radionuclide endocrine, musculoskeletal, monoclonal antibodies, gallium and indium infections, and respiratory.
    6. Discuss sensitivity and specificity of each radiopharmaceutical and biodistribution.
    7. Recognize the physical characteristics of gallium, indium, 131-I, 123-I, 125-I, Tc-99m methyl diphosphonate (MDP), pyrophosphate (PYP), hydroxymethane diphosphonate (HDP), macroaggregated albumin (MAA), HAM, diethylenetriamine pentaacetate (DTPA) and 133-Xenon.
    8. Identify contraindications of pharmaceuticals and radiopharmaceuticals.
    9. Calculate doses for adult and pediatric patients.
2. Identify and recognize indications for each in-vivo and in-vitro nuclear medicine procedure.
    1. Identify three indications for each in-vivo and in-vitro nuclear medicine procedure.
    2. Give examples of normal appearances for each in-vivo and in-vitro nuclear medicine procedure.
    3. Compare and distinguish the indications for the adult versus the pediatric patient.
3. Identify anatomy, physiology, and cross-sectional anatomy for each in-vivo and in-vitro procedure.
    1. List five functions of the skeletal system.
    2. Describe the composition of bone.
    3. Relate the function of bones to the associated muscles and ligaments.
    4. Describe the formation of the bones.

5. Define *osteocyte*, *osteoblast*, and *osteoclast.*
6. Differentiate between calcification and ossification.
7. Describe the haversian system.
8. Describe the abnormal bone images resulting from the following conditions or diseases: osteomyelitis, fractures, response to P-32 therapy, osteoporosis, Paget's disease, primary and secondary cancer, metabolic disorders, arthritis, trauma, and stress.
9. Name three conditions that result in abnormal-radionuclide deficient areas on a bone image.
10. Describe two conditions that can be distinguished by joint imaging.
11. Differentiate between hematopoietic and reticuloendothelial function of the bone marrow.
12. Indicate areas of normal bone marrow function in an adult and a child.
13. List four conditions that can have increased bone marrow activity.
14. Explain the relationship between bone marrow imaging and liver/spleen imaging.
15. Differentiate between antibody and antigen.
16. Name four tumors on gallium-67 images.
17. Describe the four main functions of the lung.
18. Describe the pulmonary circulation from the right ventricle back to the left atrium.
19. Identify six symptoms that might be present in a patient with pulmonary embolism (PE).
20. Explain why perfusion defects are often seen in patients with emphysema.
21. Describe the anatomical location of the lungs.
22. Name and locate the lobes of the lung.
23. Compare the right lung with the left lung anatomically.
24. Differentiate between respiration and ventilation.
25. Define *eupnea, apnea, dyspnea*, *orthopnea*, *hyperpnea*, and *tachypnea.*
26. List the major steps in the formation of a clot.
27. Differentiate between a thrombus and an embolus.
28. Explain why deep vein thrombosis detection is important.

4. Evaluate and select data acquisition parameters and processing for each in-vivo and in-vitro procedure.
    1. Define instrumentation parameters for whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    2. Explain instrumentation requirements for whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    3. Describe imaging parameters for whole body and 3-phase bone, bone marrow, joints, infection, and respiratory.
    4. Explain and evaluate single-photon emission computed tomography (SPECT) imaging of the whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    5. For whole body and 3-phase bone, bone marrow, joints, parathyroid, infection, and respiratory, demonstrate the technique for performing imaging procedures to include dose-to-scan time, instrument parameters, and filming protocols.
    6. Discuss instrument resolution and sensitivity requirements for the performance of whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    7. Discuss the technical problems associated with the imaging of low energy photons from 133-Xenon.
    8. Compare and contrast the use of parallel hole, focusing, and slant-hole collimators for whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    9. Describe one computer method of data manipulation for the whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory images.
5. Describe patient positioning and anatomical landmarks.
    1. Point out and demonstrate the anatomical markings for each of the following procedures: whole body and 3-phase bone, bone marrow, joints, tumor, infection, and respiratory.
    2. Discuss the use of point sources during imaging.
    3. Determine probable artifacts for each procedure.
    4. Discuss the difference between lateral views and cross-table views.
    5. Define and discuss the following terms and their relationship with each procedure: *anterior*, *posterior*, *left lateral* (LL), *right lateral* (RL), *left anterior oblique* (LAO), *right anterior oblique* (RAO), *left posterior oblique* (LPO), *right posterior oblique* (RPO), *transverse*, *transaxial*, *coronal*, *sagittal*, *horizontal long axis*, and *vertical long axis*.
6. Describe patient preparation for each in-vivo and in-vitro procedure.
    1. Explain all procedures to the patient prior to the beginning of the exam.
    2. Evaluate and verify every procedural order.
    3. Prepare and obtain consent when necessary.
    4. Evaluate and verify the possibility of pregnancy for all women between the ages of 10 to 55.
    5. Identify and verify the patient's name.
    6. Evaluate and verify the correct syringe and dose for each patient.
    7. Explain the importance of removing all metal from each patient.
    8. Discuss probable drug interactions and side effects for each procedure.
    9. Discuss the interference of body fluids for each procedure.

Evaluation Criteria/Policies:
The grade will be determined using the Delaware Tech grading system:

90	–	100	=	A
80	–	89	=	B
70	–	79	=	C
0	–	69	=	F

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Integrate principles of theoretical knowledge and demonstrate entry-level skills pertaining to nuclear medicine in-vivo and in-vitro procedures, radiation safety, quality control, quality assurance, NRC regulations, patient care, radiopharmaceutical preparation and administration, instrumentation and medical informatics.
2. Exhibit verbal, nonverbal, and written communication skills during patient care, research, and professional scope of practice.
3. Competently perform all in-vivo and in-vitro procedures.
4. Abide by the profession's code of ethics as stated in the American Registry of Radiologic Technologists (ARRT) and Nuclear Medicine Technology Certification Boards (NMTCB).
5. Exhibit critical thinking and problem solving skills during the practice of nuclear medicine.
6. Perform all entry-level procedural computer analysis.

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.